

Tobacco Use Among Adolescents: The Need for a Preventive Public Health Approach

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Introduction

The negative health consequences of tobacco use are not unknown in the public health and medical healthcare fields. Data have shown that the link between smoking and adverse health effects is undeniable. Cigarette smoking has led to increased rates of cancer, respiratory ailments, cardiovascular disease and stroke (CDC, 2004). These consequences all lead to a decreased quality of life for individuals and also an increased cost to healthcare systems and to society as a whole. The wide-ranging consequences of the decision to smoke cigarettes, the addictive nature of cigarettes and the expansive effects of smoking on society and the public make the issue of tobacco use a clear public health issue.

While the health consequences are most commonly realized in adulthood, the behavior, itself, is now becoming common among adolescents. The issue of tobacco use is one that casts a wide net in terms of those who make the decision to initiate smoking. The issue must be considered in a broader way than simply as an adult public health problem. Between 1997 and 2003, the rates of smoking among high school students dropped from 36% to about 22%. However, between 2003 and 2009, declines slowed from 22% to 20%. The slowing decline in teen cigarette use suggests that smoking and all the health problems related to smoking will continue as teens become adults. (CDC, 2011). Data show that the percentage of adolescents who report smoking cigarettes has increased since 2009 (SAMHSA, 2011).

Prevention of tobacco use is an essential responsibility of the public health field. The public health field has a targeted focus on the community as well as the prevention of

health consequences related to individual behaviors. This foundation for public health makes the use of tobacco among adolescents an obvious and prime area of required focus for the field.

As with any public health approach, the consideration of multiple factors is necessary in determining who the problem affects and why the problem might be affecting certain populations and not others. The social determinants of health are a key tool in examining the way in which the use of cigarettes has had an impact on certain populations.

This paper seeks to better understand the issue of tobacco use as it relates specifically to adolescents. It will explore the habits and behaviors related specifically to this population and expound upon the need to give this particular population a greater focus. Based on an examination of the literature on the topic, recommendations will be provided on ways in which the public health issue can and should be addressed in order to ensure that effective steps are taken to limit the potentially adverse consequences caused by the prevalence of tobacco use.

Literature Review

Public Health and Public Health Leadership

The role of public health has been outlined to have a focus on areas of prevention and health promotion activities (Turmock, 2007). In 1988, the institute of Medicine identified the core functions of public health: assessment, policy development and

assurance. Together, these three functions provide a comprehensive framework to guide public health officials on their responsibility to aid in providing a holistic quality of life and wellness for the nation's public. Public health leadership has been characterized by a mission or purpose driven quality (Koh, 2009). Leaders in public health have a responsibility to work on behalf of the general public and must act in accordance with the common good. Like no other profession, these leaders, in particular, perform their duties in a very open and "public" way as they are trying to affect change on a broad scale (Koh, 2009).

Strong leadership in public health requires a clear examination of the current state of the health of the public and an ability to recognize a needed area of focus. The observation of negative health consequences, potentially devolving quality of life and the ability to potentially prevent further damaging consequences to individuals, societies and communities can serve as a marker to public health leaders that a certain issue requires focus. These markers combine to point to the significant issue of adolescent tobacco use that has far-reaching consequences if not addressed.

Adolescent Tobacco Use

Tobacco use among adolescents in the United States is increasing at alarming rates, causing serious concern regarding health issues in young adults and increasing mortality rates across the country (FDA, 2011). Cigarette smoking is increasing among the entire youth population, and in particular the African-American youth population (Blum,

Beuhring, Shew, Bearinger, Sleving, Resnick, 2000). A variety of research models have been constructed to study cigarette smoking trends in teen and young adult populations, considering different socioeconomic and other variables including race/ethnicity, median income levels, family structures, school environment, etc.

The issue of cigarette smoking in young adults is a complex and important matter, with various indicators for smoking initiation and continuation. Scarinci, Robinson, Alfano, Sbikowski, and Klesger (2001) studied the relationship between SES, ethnicity, and cigarette smoking in urban adolescents. Various factors were used in data collection. With regard to ethnicity, overall white students were found to be the most likely group to smoke cigarettes during adolescence. This finding comports with a number of other studies conducted, including Blum-et al. 2000 and Soteriades and DiFranza 2003. The research conducted by Scarinci et al.(2001) showed that there are various SES factors which can be studied with regard to adolescent smoking. This particular study sets out to examine three main issues: 1) a the relationship between cigarette smoking among a 7th-grade population, race/ethnicity, and a set of community- and school- based indicators; 2) to determine which of the indicators studied had the most significance on tobacco use in the students; 3) to compare the SES/cigarette smoking status relationship between the African American and white populations.

Factors Influencing Adolescent Tobacco Use

Scarinci et al. (2001) points out that income is the most important indicator in the

African-American population, as their research shows that as the income level decreases in said population, the use of cigarettes also increases. In fact, the study points out that while income alone may not be a significant indicator of smoking, it is quite relevant when considered with ethnicity as an independent variable (Scarinci, et al. 2001). While trends in this study do not vary much among whites depending on income level, lower-income African-American youths were roughly two times more likely to smoke than moderate-income youths in their race category. As the study shows, income and ethnicity cannot be ignored in the process of determining the best action to take to combat the ever-present tobacco use problem in this country.

As Blum (2000) demonstrates, age of the population being studied is also a relevant factor. When considering the income indicator on youth smoking, research found that cigarette use declined as income increased in younger adolescents, but that the opposite held true for older students (Blum, et al. 2000). Older students were more likely to engage in smoking cigarettes if the family income was lower. Again, this further demonstrates the relevance of income in the study of the issue of tobacco use among adolescent populations.

In 1996, Kaplan et al. published one of the first comprehensive reports examining statistics in every state of the United States to determine relationships between income inequality and health risks/mortality among the populations. While their research only suggests certain trends rather than proving them, they do signal more research in the field of income relationships to health risks including cigarette smoking. The mortality levels do show a direct relationship with income inequalities across the United States, which may be driven even further when considering wealth inequality (Kaplan et al 1996).

Within the category of income related to cigarette smoking in teens lie many other factors to take into consideration such as family structure (Blum, et al. 2000), community and neighborhood factors, parental education level, and school restrictions and educational programs (Soteriades and DiFranza, 2003). A study published by Soteriades and DiFranza in the American Journal of Public Health (2003) points out the trends in the education levels and smoking status of the parents of adolescent smokers across income levels. They found these factors to be more significant than even other strong indicators of youth smoking, such as peer smoking, weekly allowances and disposable income, age and race (Soteriades and DiFranza, 2003). Parental education level was strongly inversely correlated with the decision of adolescents to initiate the use of smoking cigarettes.

The research mentioned suggests a strong need to study the effects of income on cigarette smoking in teens in conjunction with other independent variables including SES indicators as well as age, parental influence, peer pressure, education level, and other factors. However, these indicators should not be used interchangeably when applied to cigarette smoking studies, as they hold varied significances (Scarinci, et al. 2001).

To emphasize the importance of income on this growing health risk, in 2011 Hosseinpoor, Parker, d'Espaignet, and Chatterji published a study on the results of the World Health Survey with regard to cigarette smoking across different income populations around the world. The study reports that more than 80% of the worldwide population of cigarette smokers are inhabitants of low- and middle- income countries. The study attempts to delve deeper into the various SES and other determinants contributing to the vulnerability of these populations. For example, low education level seems to be a

significant contributor to the smoking rates and the study also found that there were greater differences between the lowest versus highest income groups while there were not such significant differences among the middle-income populations (Hosseinpour, et al. 2011). While this study researched adult trends, the relationship between cigarette smoking and disability/mortality is alarming. Beginning attempts at prevention and cessation during adolescence is therefore imperative.

Health Effects of Tobacco Use on Adolescents

Furthermore, the health effects of cigarette smoking are certainly not absent in the adolescent population itself. In fact, in 1988 Alexander and Klassen, when studying the correlations between substance use and illness in teens, found that students who smoked cigarettes frequently were 2.6 times more likely to be absent from school than non-smoking students. Another important finding was that while students who used drugs were absent at a reported index of 3.57 (a significant finding), the index was reduced to 1.07, a much less significant difference when cigarette smoking was removed from the index, showing that cigarette smoking was the most important indicator for absenteeism in the students (Alexander and Klassen, 1988).

To further demonstrate the negative health effects of cigarette smoking on young people, An, Berg, Klatt, Perry, Thomas, Luo, Ehlinger, and Ahluwalia (2009) showed that cigarette smoking teens exhibit higher frequencies of symptoms such as coughing, sore throat and shortness of breath. Since research has shown that cigarette smoking has a

tendency to increase in frequency during the teen and young adult years, it is imperative to develop methods and effective strategies for prevention during the adolescent years even for occasional smokers (An, et al. 2009). This study has importance because the authors point out that many adolescents discount or do not respond to the knowledge of long-term negative effects of cigarette smoking, since they do not experience any of those symptoms yet (An, et al. 2009). Therefore, bringing to light some of the immediate, short-term effects of smoking which will be more visible and understandable to the youth population may have a positive effect, particularly for teens who are only occasional smokers or that are considering quitting (An et al. 2009).

Lending additional support to the fight for prevention of cigarette smoking in American youngsters, is the 1998 article written by Berenson, Srinivasan, Bao, Newman III, Tracy, and Wattigney which gives some alarming statistics of occurrences of atherosclerosis, unhealthy arteries and cardiovascular disease in youngsters on whom autopsies were conducted. Cigarette smoking was considered to be a major contributor to these serious health risks in young people (Berenson, et al. 1998). These health risks may also be tied to the important indicator of income as well. Diez-Roux, Northridge, Morabia, Bassett, and Shea (1999) draw correlations between the high rate of cardiovascular disease and morbidity in Harlem to the high percentage of risk factors within the population. Since the 1980s, cardiovascular disease has been one of the leading causes of death in the Harlem population. The study showed that the rate of cigarette smoking within that population was in the 40th percentile, giving evidence to the serious health risks posed by tobacco use in lower-income populations (Diez-Roux, et al. 1999). Other factors also

correlated with greater tobacco use in this study, such as homelessness, unemployment, and low education levels (Diez-Toux, et al. 1999).

While most are aware of the risks of lung cancer in adult smokers, in 2002 Wiencke and Kelsey discuss how critical the adolescent period is in the development of healthy lungs. The lungs continue to grow from birth to adulthood, and the research shows that cigarette smoking before full lung maturity (after age 18) hinders the healthy growth of lung volume. The study indicates that cigarette smoking at an early age puts young people at a greater risk for developing lung cancer later in life (Wiencke and Kelsey 2002). The study calls for greater development in the research of the biological effects on the development of the lungs from smoking at a young age, including intermittent smokers, former smokers, and regular smokers (Wiencke and Kelsey 2002). Mermelstein further develops this point in 2003 in “Teen Smoking Cessation”, suggesting there could be very harmful consequences of waiting beyond adolescence to begin cessation efforts. This is given even further support by the statistic cited in 2009 by Breland, Colby, Dino, Smith, and Taylor that 80-90% of adult smokers begin smoking during early adolescence.

Tobacco Cessation and Prevention Programs

The major health risks posed in the short-term and in the long-term for young smokers suggest a serious need for cessation and prevention programs. Cessation programs would be aimed toward those who have already begun using cigarettes while prevention programs would be specifically focused on those who have not yet initiated or

those who have not engaged in the behavior to the point of addiction. The research discussed so far shows the importance of implementing education and restrictions in the home by the parents, in the schools, and in the community. The effects of smoking cessation campaigns in schools, in the home, in the media and with the use of technology to reach the young populations are also of importance to consider.

Several suggestions have been made about types of programs that may be used to target young people in the fight to combat cigarette smoking. The Not on Tobacco, NOT, campaign was put forward by the American Lung Association as a school-based intervention to address the use of cigarettes among adolescents. This program has been demonstrated to have not only effective but also cost-efficient results (Dino et al, 2008). Results showed that 1 in 10 students who participated in NOT were likely to quit smoking until at least the age of 25; 1 in 14 were shown to have reduced rates of tobacco use (Dino et al, 2008).

One particularly useful study was published in 2011 by Horn, Dino, Branstetter, Zhang, Noerachmanto, Jarrett, and Taylor. In this study, the effect of adding physical activity to regular smoking cessation programs in the school was studied. Adding a program of physical activity seemed to have a very significant positive effect on smoking reduction, prevention, and cessation, considerably higher than using the school program without the added physical activity portion (Horn et al. 2011). Physical activity tends to decrease in the adolescent years, so developing further research on the benefits of adding programs like these to schools in hopes of curbing cigarette smoking could prove to be very useful in conjunction with the anti-smoking campaigns already used in the school

systems (Horn et al. 2011).

These findings may be considered in conjunction with another study conducted by Weinstein, Mermelstein, Shiffman, and Flay in December 2008 studying the correlation between mood variability and smoking in young people. The study showed a definite correlation between negative mood and smoking, indicating that cigarette smoking is being used as a “mood-stabilizer” in adolescents (Weinstein et al. 2008). This negative association may perhaps explain the extended use of cigarettes over time and the development of dependences and addictions. Some of the negative mood factors used in this study such as feelings of loneliness, being left out, feeling embarrassed or sad, or being angry are typical emotions of adolescents. Perhaps exploring the model proposed by Horn et al. (2011) would be worth mentioning. The mood-stabilizing effects of cigarettes are one way young people have found to deal with their negative mood impulses and typical feelings of confusion and identity issues. Perhaps using models such as the one presented by Horn et al. (2011) could replace the dangerous and negative effects of mood-stabilizing cigarettes with feelings of personal accomplishment, achievement, stability, and physical/emotional strength by adding physical activity and other positive hobbies and reinforcers to the routines of these adolescents.

Intervention efforts have also targeted areas of low-income as income has played a clear role in cigarette use as was noted earlier. Miller and Sedivy (2009) demonstrate the importance and efficacy of low-cost options and subsidized interventions. As noted, the issue of access to care is a critical one when dealing with the low-income populations. Kendzor, Businelle and Costello (2010) corroborate this finding with their emphasis on

financial strain having a key impact on whether smokers have access to assistance to quit.

Certainly understanding the factors that are most successful in adolescents quitting smoking are worth examining for policy-makers and researchers trying to curb this problem (Mermelstein 2003). This is true in particular because rates of quitting or “aging out” of smoking are not very high, so cessation efforts are very important (Mermelstein 2003). In Mermelstein’s study, reasons for quitting were things such as health concerns, saving money, and image. However, the author warns that these are still abstract ideas to young people, and actually quitting requires further research on the efficacy of the programs being used and the development of new programs (Mermelstein 2003).

Grinshaw and Stanton 2010 also add that relapses are important to consider when dealing with smoking cessation as well as varying interventions, such as psycho-social, motivational, physical, and pharmacological interventions (Grinshaw and Stanton 2010).

Understanding the various factors involved – SES, personal, school, community, mood, income, age, and others – raises the critical issue of developing truly effective prevention and cessation programs aimed at young people specifically to curb the dangerous negative health effects posed. Breland et al. (2009) discuss some of the barriers to effective smoking cessation programs for young people, including: lack of funding for treatment and prevention, age restrictions on quit-lines and other available services, need for parental consent for trial studies, proper evidence-based evaluation of smoking cessation programs being used. The authors suggest expanding training and education regarding youth smoking for healthcare providers, use of behavioral programs as well as pharmacological programs, advocating for coverage for treatment options by Medicaid and

other insurances, and funding the proper evaluation of evidence-based programs (Breland, et al. 2009).

There are a number of challenges blocking the cessation programs' efficacy in adolescent groups, including their need for privacy and autonomy, the irregularity of teen smoking in general, teens' limited access to the cessation programs available and other factors (Liu, Peterson, Kealey, Mann, Bricker, and Marek 2007). In a study published in 2007 in *Preventative Medicine*, the authors offer several ways of working through these challenges to still maintain effective cessation programs such as: proactively finding participants (smokers and non-smokers), conducting interviews by telephone to deal with privacy issues and not restricting the number of calls, individualizing treatments, and showing respect for the decisions made by the adolescents (Liu, et al. 2007).

The cultural and social influences on adolescent cigarette smoking are important to understand in order to develop effective prevention and cessation models. In 2005, Piko, Luszczynska, Gibbons, and Tekozel discuss important personal and social indicators for smoking in young people that need to be examined when developing models for cessation (Piko, et al. 2005). One of the most significant factors shown to increase smoking is peer use of cigarettes. Other important factors are positive self-image, and positive orientation with the future, with which many young people struggle (Piko et al. 2005). Extending the study to different countries, the authors found that personal and social factors do have a significant contributing effect on smoking at young ages. In this study, a positive feeling of life achievement and satisfaction, positive social comparisons, and positive vision for the future all contributed to lower rates of cigarette smoking (Piko, et al. 2005). This

seems to agree again with the model posed by Horn et al (2011) suggesting physical activity would replace the negativities associated with smoking with more positive feelings in young people.

Several evidenced-based practices and programs have also been put in place to address adolescent smoking. Through rigorous data collection and evaluation, these programs have demonstrated positive outcomes and have been certified as being part of the National Registry of Evidence-based Programs and Practices (NREPP). As noted above, school-based programming has proven effective in combating adolescent tobacco use. The Building Assets-Reducing Risks (BARR) program is a school-based program which combines principles of leadership, community and communication to work with students to prevent tobacco use. Across Ages is another intervention which has been certified as an evidenced-based program. This program pairs older adult mentors with adolescents to work together to address tobacco and other substance use behavior. In addition, Guiding Good Choices focuses on parental education and the role parents play in guiding decisions of their children. These initiatives have gone through a process of formal review and examination to become part of the national registry of effective interventions. (SAMHSA, 2011).

The final step then is to synthesize all of these important factors to develop effective methods of targeting the youth for prevention and cessation. There are many programs already in use, such as school programs, radio and television ads, and more recent technological ways of reaching out. The efficacy of each has shown varied results. One study conducted by Solomon, Bunn, Flynn, Pyrie, Worden, and Ashikaga in 2007

followed a 3-year long campaign using 30-second radio and television ads as a forum for smoking cessation in adolescents. The results showed that although there was not an overwhelming effect on cessation from the campaign alone, there definitely was significant impact in the areas of prevention and quitting for intermittent smokers as well as a positive impact when combined with other cessation programs that were running simultaneously (Solomon, et al 2007). There also was a response to the emotionally-charged ads that were run, getting a greater response when combining health risks with negative emotions in the ads (Solomon, et al. 2007). Therefore, the authors suggest that rather than a singular approach, cessation efforts in the media should attempt to integrate self-help and realistic assistance options into the mass media ads.

Advertisements that focus on factors such as negative health effects, tobacco industry practices and targeting of youth, do seem to have an important deterrent effect on smoking in young people, and should be developed even further (Klein, Havens, Carlson, 2005). In an evaluation of the anti-smoking campaign *GottaQuit.com*, the authors concluded that almost all of the teens included in the study (smokers and non-smokers) had some knowledge or had visited the site *GottaQuit.com* (Klein, et al. 2005). Among those who visited the site, smokers visited more often. The results found that most adolescents recognized the site and its purpose, recognized and understood its logo “I’ve gotta quit, I just need a little help,” and most smokers reported being able to relate to the advertisement themes (Klein et al 2005), suggesting that the Internet can be a very useful mechanism in conjunction with other mass media campaigns in targeting young smokers. As the authors point out, “The tobacco industry spends nearly \$7 billion a year to advertise and promote

cigarettes. Thus, successful counter-advertising and smoking-cessation strategies must be established.” (Klein et al, 2005)

Methods

As evidenced above, an objective examination of the literature was conducted to ascertain the state of the current situation as it relates to tobacco use among adolescents. As the problem is indiscriminant in who it affects, it is necessary to consider the public health issue as one that is multi-faceted. Factors such as income, socio-economic and educational status were considered in both the examined literature and the subsequent recommendations.

In order to ensure a comprehensive search and review of the literature, multiple sources were utilized. Both websites and electronic search software were used. Federal sources of information were used to ascertain the situation from a national perspective. These sources include: the Food and Drug Administration, the Substance Abuse and Mental Health Services Administration and the Centers for Disease Control and Prevention. Utilizing these sources allowed for an examination of the problem from a broad perspective.

In order to narrow the focus of the review, keywords were used in searches to allow for a targeted examination of the available. These words included: tobacco use prevention; adolescent tobacco use and prevalence; school-based interventions. Also included were elements related to potential factors which may have had an effect on

tobacco use. These factors included: age, income, education level and income.

Combining these search terms allowed for a review of the literature which took into account multiple associations related to tobacco use. Noted search engines and sources such as “End Note and PubMed were utilized. Articles were reviewed for sound and valid methodological approaches.

A public health approach to the examination of the issue has been applied to ensure that critical elements of public health such as community and prevention are included in the recommendations provided. In addition, essential components of public health such as policy development and assurance are considered in the formulation of recommendations to address the issue.

Recommendations for addressing the use of tobacco among adolescents are intended to cover a comprehensive span of the issue. Based on the findings in the literature, it is evident that the issue of tobacco use must be attacked from multiple levels of society and must utilize multiple communication strategies. To that end, the recommendations focus on a broad and expansive approach which incorporates findings from the literature and the application of a public health model.

Recommendations

As noted above the literature well documents the health effects associated with tobacco use. Tobacco use has been clearly linked with heart disease, respiratory ailments and lung cancer. As the role of public health continues to expand in the United States, it is

critical that this issue be given serious consideration. Based on the previously noted review of the literature, several key recommendations can be made. These recommendations span a broad scope as do the consequences of tobacco use. The scope includes: the population of focus, a targeted approach to programming, use of technology, quality improvement and policy development. The Socio-ecologic Model can be utilized as an organizing framework to contextualize these recommendations.

Focus on Adolescents

The first major recommendation relates directly to the subject being discussed in this paper. The issue of cigarette use is not at all solely limited to the adult population. Along with use not being limited solely to adults, the damaging health consequences associated with use are also not limited solely to the adult population. As noted, the literature also documents the consequences related to health that are faced by adolescents who engage in cigarette smoking activities. The application of a public health model to the issue suggests that prevention is a key operating premise in combating the tobacco use problem in the United States. Prevention is the foundation on which public health is formed. The goals of prevention and promotion of public health are foremost in the field of public health (Turmock, 2007). To that end, it is critical that the solution be aimed not solely to stop those who have already begun smoking but also to prevent those who have not yet initiated smoking. In addition, it is also imperative that activities be focused on health promotion activities which provide individuals with enough information and

education to assist them in making choices about their behaviors and lifestyle which aid them in obtaining a healthier and improved quality of life.

This premise leads directly to the first recommendation which ties directly to the first level of the SEM. This is an active targeted strategy to deal directly with adolescents. It is the role of public health officials to work with schools, communities and parents to assist adolescents in understanding the dangers associated with beginning to smoke cigarettes. The focus must be on dealing with children and adolescents directly and not assume that it is the responsibility of the parents to address this particular issue. Given the serious individual and societal consequences associated with the initiation of tobacco use, the issue must be seen as one in which public health can play a major role in preventing.

School-based Programming

The second recommendation relates directly to the mechanism by which to reach adolescents as a key focus of the public health intervention. As the SEM suggests, the interpersonal level plays a role in determining behaviors, actions and circumstances. Schools are primary in this level especially with respect to adolescents. One way in which this can be achieved is through a focus on school-based programs. Tobacco use education should not be considered a periphery issue that finds its way into school curriculum in an almost incidental manner. As noted earlier in the paper, resources such as Not on Tobacco (NOT) have been utilized in schools to ensure that cigarette smoking education is perpetuated throughout school systems. The NOT Program has been adopted and

implemented in 40 States since 2001. As the aforementioned data note, the program has had considerable success with reducing and eliminating cigarette use among adolescents in the program (Dino et al, 2008). The recommendation, here, is to strengthen that type of programming even further to integrate tobacco cessation education into the regular health curriculum of both elementary, middle and high school education.

This education should take into account ways in which students will hear and receive messages. It is not enough to simply apply an adult learning model onto an educational campaign for children and adolescents. States and communities should work to pass regulations such that schools integrate a comprehensive approach to educating students on tobacco use as a regular part of their education. This educational effort should not solely be limited to the health effects of smoking cigarettes. Specific strategies for implementation or areas of focus are provided below.

The educational effort should be multi-faceted and utilize various strategies to address the smoking cessation issue. As the research above notes, peer smoking is an indicator of whether or not adolescents will begin to engage in tobacco use. The curriculum should, therefore, also contain an element of dealing with the pressure that may be felt from peers. It should not merely deal with the scientific aspects of tobacco use. For example, curriculum can be developed which deals specifically with addressing the perceptions of adolescents related to peer use of tobacco. A specific module can be utilized to address the importance of not succumbing to peer pressure. This module could also include a chance for adolescents to voice their experience regarding interacting with peers who may smoke.

Additionally, theoretical models such as the Health Belief Model (HBM) should be utilized to address which aspects of the issue will bear relevance and focus. A simple pre-course assessment would enable schools to ascertain students' perceived risks of smoking and barriers to not initiating the use of cigarettes. These assessments can be used in an effort to tailor the materials taught to address the habits, knowledge and attitudes of the students being taught. While funding of such programs may seem to be an issue, the long-term savings for individuals, the healthcare and hospital system and society would yield a benefit which outweighs the initial cost incurred by modifying educational strategies to include this issue as a component.

The examined literature also shows the importance of focusing not only on educating students in the classroom but also combining these efforts with various activities which may cause a reason to decide not to smoke. Examples include the initiation of more physical activity in schools as a requirement. Smoking greatly hinders the ability of students to engage successfully in physical activity and exercise with ease. Physical education classes may be an ideal opportunity for this to be emphasized. The emphasis here would not significantly impact schools in terms of funding needs but could substantially enhance the ability of students to make a decision against smoking initiation.

The need for education is one that is not limited to certain neighborhoods, communities or localities. Certain areas, however, do warrant additional attention and focus. As the research noted above suggests, those in low-income areas and areas of lower educational standing tend to experience higher rates of cigarette use (Hoisenpoor et al, 2003; Soteriades et al, 2001; Diez-Toux et al, 1999). Issues that plague the dis-

enfranchised population are not uncommon to public health. In fact, it is a stated goal of public health that this particular population will be a target audience for needed interventions that may eventually lead to improved health outcomes and an overall better quality of life. As noted above, successful interventions have included aspects which take into account the need for low-cost services and directly reflect the understanding that serving this population requires an understanding of their financial and economic needs and abilities. As noted earlier, subsidized services, for example, have proven to be utilized and have demonstrable positive effects for the population.

Utilizing the Social Determinants of Health: Focus on the Dis-enfranchised

Examining the social determinants of health such as income, SES and educational level tie into the third recommendation which also centers in the interpersonal level of the SEM. The recommendation centers on utilizing these factors to determine the extent to which tobacco use education is enhanced and strengthened in communities. The combination of research demonstrating that these populations may be more likely to use cigarettes, the associated health risks of cigarette smoking and the poor access to healthcare for these groups suggest that a targeted strategy is much needed for this population. Given the potentially severe health consequences of cigarette smoking and the lack of access to adequate healthcare, it seems evident that a targeted prevention strategy for this population would yield a significant impact and societal benefit.

The strategy must be multi-fold and take into account the potential lack of

resources available in both schools and homes. Federal and state governments should make a concerted effort to focus on dis-enfranchised communities, i.e., those in which median income is low and access to healthcare is difficult, as a target population for increased education and intervention. This should be done through the increase of funding for efforts in these communities. While the current era comes with extremely restrictive budgets for both states and communities, data should be utilized to demonstrate the need to increase funding in these communities for these efforts. As referenced earlier in this paper, the burden of disease and mortality related to cigarette use is rapidly increasing in poor communities. This type of finding must be presented and utilized to lobby and advocate for more funding for tobacco programming in communities with greater need.

As referenced above school-based programs are critical in this effort. However, this recommendation also centers on increasing education and awareness activities in the community. Perhaps community health centers can be engaged in this effort to organize events and campaigns to assist in the knowledge-building and information dissemination related to tobacco use. In addition, other local organizations should also join the effort to help educate and raise awareness in the community. Local health departments, churches and community organizations can be used to increase the effectiveness and reach of the approach.

Community coalitions may be utilized to organize educational opportunities for both parents and children. The effort of parents, educators, administrators and adolescents to work together to address the issue of tobacco use cannot be overlooked. The use of evidenced-based practices is critical in the fight against tobacco use. As mentioned earlier,

methods with a proven evidence base do exist. For example, the aforementioned practices such as BARR and Guiding Good Choices should be utilized to aid in determining strategies for educating parents as well as adolescents.

Teaching parents is a key element of this effort as data show that parental smoking is an indicator of adolescent initiation. Coalitions may also be utilized to organize smoke-free events for adolescents such that they understand that not “everybody” is smoking. This ties directly once again into the issue of peer pressure and the perceptions related to the fact that everyone seems to be using cigarettes so the harm must not be that great. These type of events and educational opportunities’ can serve to shift the mental model of those in communities which may not previously have had access to information which may assist in making more informed choices about certain health-related behaviors. The importance of shifting a mental model should not be overlooked. (Kelly, 2007). The way in which individuals operate is very closely linked to the way in which they think about certain things. This concept is also applicable to adolescents and children. If a strategy is aimed at educating, informing and reshaping how and what people think, the likelihood of behavior change is high.

Use of Technology

The previous two recommendations relate directly to the need to increase awareness and knowledge about the use of cigarettes. The next recommendation relates directly to a potential forum for increasing that information and access to information.

While “hard-copy” complete with posters and brochures should not be overlooked, the strategy must also reflect the current time in which we are living. Technology is a powerful tool for communication and information dissemination in all arenas and fields. The field of public health is no different. This field must utilize the available technology to push education and information sharing.

This strategy also relates directly to the population of focus. Now, more than ever before, adolescents are exposed to multiple uses of technology. The previous use of radio and television as major components of technology have expanded greatly to include the internet, cellular communication and various means of social media.

The research well documents the use of technology as a tool in addressing cigarette use behaviors. The recommendation is to enhance this use of technology particularly due to the focus being specifically on a younger population. The younger population has a familiarity and an ease with using technology in various aspects of daily routine. This routine use of technology should be capitalized on to develop strategies to raise awareness among this population. Public health marketing requires an awareness of the target audience and the extent to which this audience responds to messages in various types of formats and media. The use of technology to reach this population seems to be an essential component.

Technology uses should be utilized on a national and community level. On a national level, many federal agencies in the Department of Health and Human Services (HHS) are dedicated to addressing public health issues such as tobacco use. These agencies should work to produce meaningful information easily understood by adolescents

that is not only available on Agency websites but also available in other for a which may be accessible to adolescents. For example, many schools have Twitter, Facebook or websites of their own. Federal agencies should make a concerted efforts in their communication plans to include ways in which to ensure these media are included as audiences for their communication regarding smoking cessation.

Communities and schools should also work to utilize technology in their effort to get information out about the initiation of tobacco use. As was noted earlier, schools must work to ensure that this component of public health is included in curriculum but they should also work to ensure that it is taught in ways in which technology is incorporated. For example, students may be given assignments that utilize a website devoted to this purpose. Students might also be asked to “like” certain websites on Facebook such that it is guaranteed that information will continue to flow to students without their being required to do something different from their ordinary routine.

The use of technology not only ensures that students are learning in a way that is comfortable and familiar to them but it also guarantees that messages are reinforced once they leave school. The learning extends beyond the classroom. This is a critical element because the temptation to smoke will likely occur in different places and the access to continual information assists in enhancing the message that the initiation of smoking is not a choice that will ultimately lead to good consequences for the adolescent.

Quality Improvement, Measurement and Evaluation

These recommendations must be included in the context of the next recommendation. While data are extensive on the health effects of smoking, as noted above, more research needs to be conducted on effective prevention efforts related to adolescent tobacco use. Therefore, the next recommendation relates directly to the need for increased quality improvement and measurement activities. This recommendation would allow a broader impact on the community and policy levels of the SEM. School, community and national efforts must continually be monitored and evaluated to ensure that the most effective efforts are being utilized.

In addition to funding being allocated specifically for programming efforts related to the cessation of tobacco among adolescents, national, state and local jurisdictions must also recognize the need to fund efforts related to the evaluation, measurement and quality improvement of these efforts.

The Department of Health and Human Services (HHS) must take a leadership role in identifying key metrics by which to measure and assess the extent to which programs are adequately and effectively preventing the use of cigarettes by adolescents. Measures may include the increase in awareness and knowledge of consequences related to smoking along with the number of adolescents who report initiating cigarette smoking. These data should be utilized to assess whether or not programs need to be modified to address different populations. Currently, national data are collected on the extent to which adolescents are initiating cigarette smoking; however, these data are not well connected to particular interventions such that funders and local entities have the ability to gauge whether certain programs are effective.

In addition to efforts to formally evaluate and measure effectiveness, these data should be used on a routine basis to increase the quality of the effort as a whole. Quality improvement efforts do not necessarily entail major complex methodology or approaches. Quality improvement efforts can be designed to focus on a small process component or a small piece of a service delivery such that a targeted approach to improving quality is possible (Kelly, 2007).

One way in which schools can utilize a quality improvement tool, for example, is by conducting a simple assessment pre, during and post an educational program or intervention. During the program, data can be used to assess whether or not students are hearing the intended messages. These data can be collected by module or topic so it is easy to assess which component may need to be modified. If funding does not allow a broad quality improvement effort all at once, schools should work to prioritize on which areas to focus for modification. This will ensure a process by which the educational efforts are continually reviewed, monitored and improved to make certain that students are receiving the information in the most effective way possible to ultimately prevent the initiation of the use of cigarettes.

Community efforts can be evaluated by assessing whether knowledge has increased and whether the change in knowledge has impacted the behavior of smoking cigarettes. Stakeholders in the community should be utilized in the effort to develop policies to improve existing programs. For example, rather than a distant assessment of the effectiveness of the prevention programs, adolescents should be consulted to assess whether they feel the efforts have had influence on affecting their choice to initiate the use

of cigarettes. These results should be utilized to enhance and modify community-based programming

Policy Change

While the aforementioned recommendations will prove effective if implemented, policy change needs to accompany these recommendations at the national and state levels. One key issue relates to funding. In the current time, budgets are extremely restricted and funding for public health initiatives is limited. Advocates need to lobby Congress and other funders to ensure that tobacco use among adolescents is at the forefront of issues and is given priority for funding. Data should be used to demonstrate the need for programming related to the prevention of tobacco use among adolescents.

In addition, additional sources of revenue should be sought to ensure that all available resources are utilized to address the tobacco use problem in the United States. One potential source of revenue is tax on the sale of cigarettes. IN many states, tax on the sale of alcohol is provided to the State's substance abuse system in order to provide funding for substance abuse treatment. There should be a conscious effort to create laws which mandate that the tax revenue on sales of cigarettes be allocated specifically in State and local budgets for the purpose of prevention programs.

In addition to additional revenue sources, laws should be strengthened to restrict the sale of cigarettes to minors. Financial penalties and fines should be incurred for those who sell cigarettes to minors. This revenue can also be used for prevention programming.

The strengthening of these laws, especially in dis-enfranchised communities, may assist in restricting access to cigarettes by minors.

Conclusions

Data show that tobacco use among adolescents is a problem which requires great attention in the United States. The problem should be viewed as a public health issue given the expansive nature of its adverse effects. If the issue is not addressed in a concentrated and expedient manner, individuals, communities and societies will pay the damaging consequences. The public health field has a responsibility to address this issue through efforts to promote prevention.

This issue provides a unique opportunity for public health leaders to exhibit qualities of leadership and foresight that are needed to address the potentially significant issues this problem poses. As noted earlier, the mission-driven focus of a public health leader must be called upon to utilize creative and innovative strategies to address the public health issue that tobacco use causes.

Tobacco use among adolescents must be approached in a comprehensive manner which takes into account the various components that drive the decision to initiate smoking. Efforts must be taken on a policy and implementation level to ensure that the subject is given the focus it necessitates.

As has been emphasized continually throughout this paper, the research is clear on the damaging effects of tobacco use and the need for preventive efforts to be targeted

toward adolescents. It is now time for public health leaders to take action in advocating for the cause to gain more attention, support and resources. Key leadership qualities such as: organization, communication and innovation are needed more than ever to assist in the fight against tobacco use.

These qualities will be required for the next step in this public health response. As mentioned, this response must be expansive and multi-faceted in order to match the consequences posed by the public health issue which are indeed expansive and multi-faceted. The next steps involve processes of education and advocacy, policy creation and ingenuity around use of existing resources and building upon existing evidence bases. As the recommendations presented suggest, the issue must be addressed at many different levels and it is the role of the public health leader to ensure these levels are targeted and covered in a meaningful and comprehensive manner. Clearly, the issue of tobacco use cannot be overcome overnight; however, the qualities of leadership and expertise of the public health field can greatly aid in ensuring the issue gets the attention it warrants and preventive solutions are actively sought to help mitigate the consequences of the public health problem.

REFERENCES

- Alexander, C. S. & A. C. Klassen (1988). Drug use and illnesses among eighth grade students in rural schools. *Public Health Report*, 103 (4), 394-399.
- An, L. C., C. J. Berg, et al. (2009). Symptoms of cough and shortness of breath among occasional young adult smokers. *Nicotine Tobacco Res*, 11 (2), 126-133.
- Berenson, G. S., S. R. Srinivasan, et al. (1998). Association between multiple cardiovascular risk factors and atherosclerosis in children and young adults. The Bogalusa Heart Study. *New England Journal of Medicine*, 338 (23), 1650-1656.
- Blum, R. W., T. Beuhring, et al. (2000). The effects of race/ethnicity, income, and family structure on adolescent risk behaviors. *American Journal of Public Health*, 90 (12), 1879-1884.
- Breland, A., Colby, S., et al. (2009). Youth smoking cessation interventions: Treatments, barriers and recommendations for Virginia. Richmond, VA: Virginia Commonwealth University. Accessed at: <http://www.vcu.edu/idas/vytp/reports/index.html>.
- De Beyer, J., Lovelace, C. (2001). Poverty and tobacco. *Tobacco Control*, 10, 210-211.
- Dino, G., Horn, K., Abdulkadri, A. (2008). Cost-effective analysis of the Not on Tobacco program for adolescent smoking cessation. *Prevention Science* (9) 38-46.
- Diez-Roux, A.V., Northridge, M.E., et al. (1999). Prevalence and social correlates of cardiovascular disease risk factors in Harlem. *American Journal of Public Health*, 891, 302-307.
- Grimshaw, G., & Stanton, A. (2010). Tobacco cessation for young people (review). *The Cochrane Library*, (1), 1-58.
- Horn, K., Dino, G., et al. (2011). Effects of physical activity on teen smoking cessation. *Pediatrics*, 128, e801-e811. [Epub ahead of print].
- Hosseinpoor, A.R., Parker, L.A., et al. (2001) Social determinants of smoking on low- and middle-income countries: Results from the World Health Survey. *PLoS ONE*, 6 (5), e20331. [Epub ahead of print].
- Kaplan, G. A., E. R. Pamuk, et al. (1996). Inequality in income and mortality in the United States: analysis of mortality and potential pathways. *BMJ*, 312 (7037), 999-1003.
- Kelly, D., (2007). Applying Quality Management in Healthcare: A Systems Approach.

Chicago, IL: Health Administration Press.

Klein, J.D., Havens, C.G., et al. (2005). Evaluation of an adolescent smoking-cessation media campaign: gottaquit.com. *Pediatrics*, 116, 950.

Liu, J., Peterson, A.V., et al. (2007). Addressing challenges in adolescent smoking cessation: Design and baseline characteristics of the HS group-randomized trial. *Prevention Medicine*, 45 (2-3), 215-225.

Kendzor, D., Businelle, M. & Costello, T. (2010). Financial strain and smoking cessation among racially/ethnically diverse smokers. *American Journal of Public Health* (100)4.

Mermelstein, R. Teen smoking cessation. *Tobacco Control*, 12 (Suppl I), i25-i34.

Miller, C., Sedivy, V. (2009). Using a quitline plus low-cost nicotine therapy to help disadvantaged smokers quit. *Tobacco Control*, 18, 144-149.

Piko, B.F., Luszczynska, A., et al. (2005). A culture-based study of personal and social influences of adolescent drinking. *European Journal of Public Health*, 15 (4), 393-398.

Scarinci, I. C., L. A. Robinson, et al. (2002). The relationship between socioeconomic status, ethnicity, and cigarette smoking in urban adolescents. *Preventive Medicine*, 34 (2), 171-178.

Soloman, L.J., Bunn, J.Y., et al.. Mass media for smoking cessation in adolescents. *Health Education Behavior*.

Soteriades, E.S. & DiFranza, J.R. (2003). Parent's socioeconomic status, adolescents' disposable income, and adolescents' smoking status in Massachusetts. *American Journal of Public Health*, 93, 1155-1160.

Substance Abuse and Mental Health Services Administration (2011). National Survey on Drug Use and Health (www.nsduh.samhsa.gov).

Turmock, B. (2009). *Public Health: What it Is and How it Works*. Sudbury, MA: Jones and Bartlett Publishers.

Weinstein, S. M., R. Mermelstein, et al. (2008). Mood variability and cigarette smoking escalation among adolescents. *Psychological Addictive Behaviors*, 22 (4), 504-513.

Wiencke, J. K. & K. T. Kelsey (2002). Teen smoking, field cancerization, and a "critical period" hypothesis for lung cancer susceptibility. *Environmental Health Perspectives* 110 (6), 555-558.

